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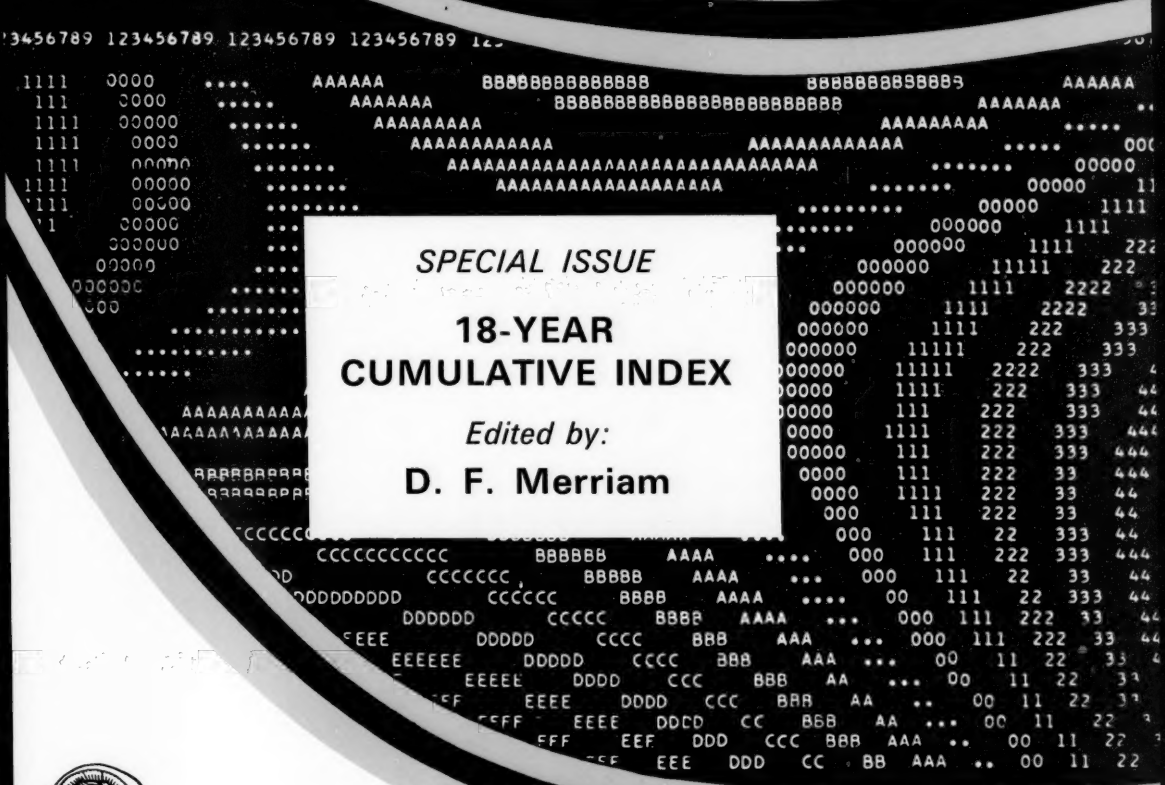

SPECIAL ISSUE

18-YEAR CUMULATIVE INDEX

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COMPUTERS & GEOSCIENCES

An International Journal devoted to the rapid publication of computer programs in widely used languages and their applications

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18 - YEAR CUMULATIVE INDEX

Edited by:

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Computers & Geosciences serves as a public medium for the exchange of ideas between the geological and computer sciences. *Computers & Geosciences* brings to its readers computer programs, algorithms, computer-aided instructional material, programming guides and applications, and other topics of interest to geoscientists working with computers. The term Geoscience is used in its broadest sense, encompassing geology, geophysics, geochemistry, oceanography, hydrology, and geography. Papers will be concerned with the computational aspects of all subjects ranging from file maintenance and data processing to the latest problem-solving techniques. The publication is intended to serve workers in academia, industry, and government. Students, teachers, researchers, and practitioners should benefit from ideas in the journal.

In addition to longer papers containing programs, algorithms, or discussion of techniques, the journal will contain short notes with timely material, book reviews of pertinent publications, and a forum for exchange of ideas. Papers on comparative results and computer graphics are especially encouraged.

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INTRODUCTION

This index represents 18 years of effort in assembling, preparing, and publishing computer programs, applications, reviews, etc. for the earth sciences. During this time several other publications offering similar services to the profession have come and gone including *Geo-processing*, *COGS Programs*, and *Geobyte*. *Computers & Geosciences*, an outgrowth of *Special Distribution Publications* and later the *Computer Contributions* of the Kansas Geological Survey and then *Geocom Programs* (Merriam, 1992), has continued to expand and thrive. Every effort has and is being made to bring to the geological (in the broad sense of the word) community up-to-date, useful, and relevant computer software. As stated in the description of this international journal, it is '...devoted to the rapid publication of computer programs in widely used languages and their applications.'

A short history of *Computers & Geosciences* was given in the first issue of 1992 (v. 18) by Merriam. As the journal expanded in size and scope, the total number of papers each year increased (Fig. 1). There have been special issues containing shorter papers, many with no program listings, through the years where large numbers of papers were published. The index in the increase in size of the journal however is best expressed in the total number of pages published which has increased from 356 in 1975 (v. 1) to 1500 in 1991 (v. 17). The true worth, of course, is in the value of the content, which is considerable if citations in the citation index is any criterion.

Payne and Merriam (1993) made a study from the citation index of *Computers & Geosciences* and its impact. They wanted to determine if specialized journals such as *Computers & Geosciences* are widely read. The assumption was that specialized journals are read only by those in the specific field and therefore the special journals have little impact outside their own area. They searched the ISI's Science Citation Index and from their analysis concluded that *Computers & Geosciences* was cited more than anticipated and that more authors outside the geosciences cited the journal than expected. These authors, however, are restricted to relatively few nongeological fields and write on computer subjects. Thus although the use of this specialized journal extends outside the subject field, it is used mostly by other specialists working in computer applications.

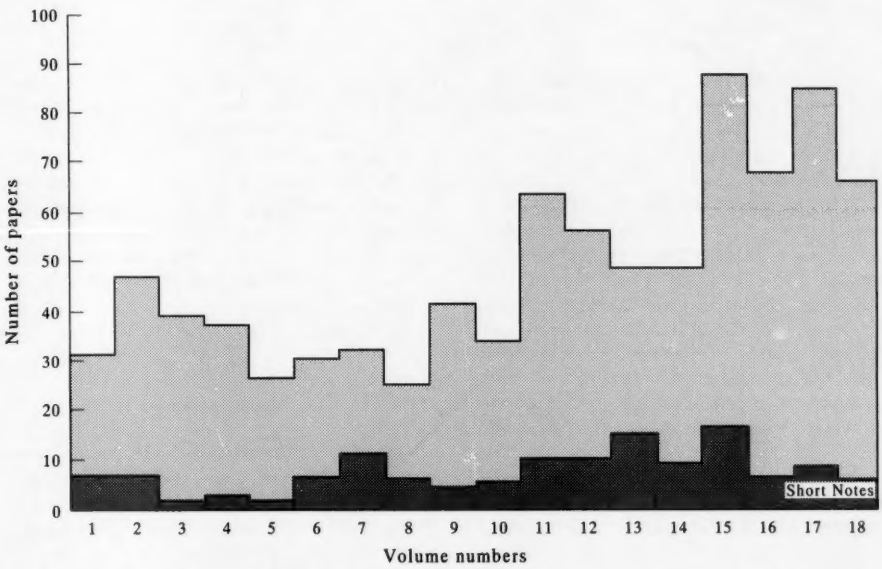

Figure 1. Number of papers and Short Notes in *Computers & Geosciences* from 1975 (v. 1) to 1992 (v. 18).

In addition to bringing to the audience computer programs, the journal has published many special conference proceedings and thematic issues. A list of these is given in Table 1. The latest one is this issue

containing the 18-year cumulative index.

There has been an evolution in the hardware during these 18 years from mainframes, minicomputers, PCs to workstations. The computer power has increased while the physical size has decreased (Merriam, 1990). Palmtop computers of today are as powerful as mainframes just a few years ago. The trend of smaller and faster continues with the introduction of the new Pentium chip which makes the 486 chip look slow. A parallel evolution in languages is taking place (Cox, 1991). With the technical advances, the philosophy of computer programming is changing too. Programs now are likely to be modules of specific programs built into a system capable of processing almost unlimited amounts of data. The programs are user-friendly, fast, and sophisticated. Programs are available from many sources however *Computers & Geosciences* provides the user with programs usually developed for specific problem-solving purposes by researchers in the field. The variety has been great.

Computers & Geosciences, *Journal of Mathematical Geology*, and *Nonrenewable Resources* are sponsored by the International Association for Mathematical Geology (IAMG). The IAMG is proud of these efforts as the Association gets ready to celebrate its Silver Jubilee in 1993.

It is hoped that this index will facilitate the use of *Computers & Geosciences*. Every effort has been made to assure the correctness of the material presented. Lois Brane entered the information and helped check the accuracy of the material. Kathy Payne adapted the indexing program for this purpose and developed the layout and format for the presentation. She also contributed and helped in many other ways. Additional computer programming was provided by Burhanuddin Hussain.

This index is arranged in three sections. Part I is a listing by year, volume, and issue number of each paper.

Table 1. List of special issues of *Computers & Geosciences*

1976	Proceedings Fourth Geochautauqua on CAI—Syracuse University	v. 2, no. 1
1976	Proceedings Symposium on Capture, Management, and Display of Geological Data—Ecole des Mines de Paris	v. 2, no. 3
1977	Proceedings 5th Geochautauqua on Computer Software for the Geosciences—Syracuse University	v. 3, no. 3
1978	Proceedings 6th Geochautauqua on Quantitative Stratigraphic Correlation—Syracuse University	v. 4, no. 3
1980	Proceedings 7th Geochautauqua on Mathematical Models in the Earth Sciences—Syracuse University	v. 6, no. 2
1983	Proceedings 1st Mathematical Geologists of the United States, Annual Conference on The Management, Analysis, and Display of Geoscience Data—Golden, Colorado	v. 9, no. 1
1983	Proceedings IGCP Project 163—Igneous Petrology Database Design and Development—Hawaii	v. 9, no. 4
1984	Proceedings IGCP Project 148—Theory Application and Comparison of Stratigraphic Correlation Methods—Geneva, Switzerland	v. 10, no. 1
1985	Workshop on Thematic Mapping Using Microcomputers—University of Leicester	v. 11, no. 3
1986	Proceedings 14th Geochautauqua on Computer Applications in Petroleum Exploration and Development—Wichita State University	v. 12, no. 4B
1988	Merriam, D.F., Bibliography of Computer Applications in the Earth Sciences, 1948–1970	v. 14, no. 6
1989	Contributions of Institute of British Geographers on Fractals and the Geosciences—Portsmouth Polytechnic	v. 15, no. 2
1989	Proceedings NATO/ASI Conference on Statistical Methods for Resource Appraisal—Il Ciocco, Italy	v. 15, no. 4
1990	Artificial Intelligence Applications in Geoscience	v. 16, no. 6
1991	Special Review Issue	v. 17, no. 8
1992	GIS Design Models	v. 18, no. 4
1992	Geographical Computing	v. 18, no. 8
1992	18-year Cumulative Index	v. 18, no. 10

Part II is an author index. Two-part surnames are indexed by the first name. For example, van Heflin would be indexed under v, Lloyd Weber under l. All forms of an author's names are listed together. An asterisk following a name refers to a first author. References are given for the year, volume number, issue number, and page number(s) of the paper. Refer to Part I for complete information. Part III is a keyword index. Keywords are those provided by the author, or in rare situations, the indexer.

No diacritical marks are used in this index.

REFERENCES

Cox, N.J., 1991, Programming languages in *Computers & Geosciences*, 1975–1989: Computers & Geosciences, v. 17 no. 4, p. 595

Merriam, D.F., 1990, Digital decade deserves soft and hard copy: Geobyte, v. 5, no. 6, p. 14.

Merriam, D.F., 1992, *Computers & Geosciences*: an editorial: Computers & Geosciences, v. 18, no. 1, p. v–viii.

Payne, K., and Merriam, D.F. , 1993, Impact of geoscience specialists journals: a study in use patterns: Geoscience Information Soc. Proc., v. 23, in press.

D.F. Merriam
Editor-in-Chief

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KEYWORD INDEX

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